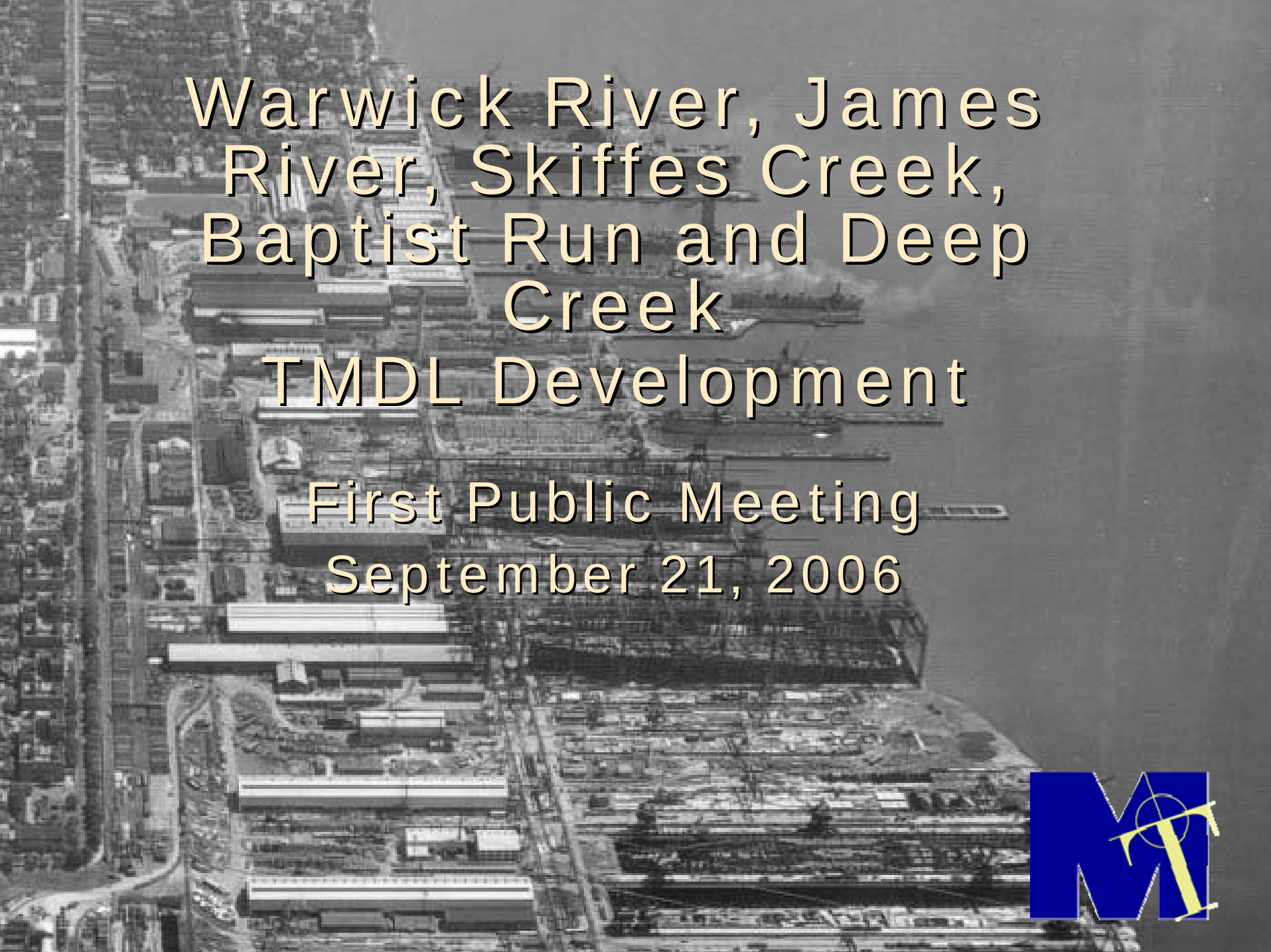


Warwick River, James River, Skiffes Creek, Baptist Run and Deep Creek TMDL Development

First Public Meeting

September 21, 2006

Why Are We Here?

- Clean Water Act 1972
  - States must develop a list of impaired waters
  - States must develop TMDL studies for waters listed
- Consent Decree 1999
  - States, including VA, were sued by the American Canoe Association
  - By 2010, VA must complete TMDL studies for all waters listed in 1998

Why Are We Here?

- To discuss the bacteria TMDL development for Warwick River, James River, Skiffes Creek, Baptist Run and Deep Creek
  - Total Maximum Daily Load
  - It is how much pollutant can enter the stream and have the stream meet the water quality standards

TMDL Process Flow Chart

The State begins a formal process to clean up that water body (a TMDL)

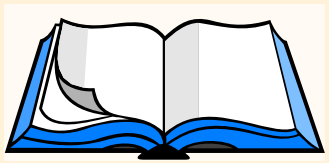
Polluted

Water quality standards not met

Study

- Identifies sources of pollution
- Calculates amounts from each source
- Estimates necessary pollutant reductions

Implementation Plan



- Identifies permit controls or best management practices needed to make necessary pollutant reductions

Implementation

Monitoring

Clean

Water quality standards met

The Process

Created by Robert Brent, DEQ

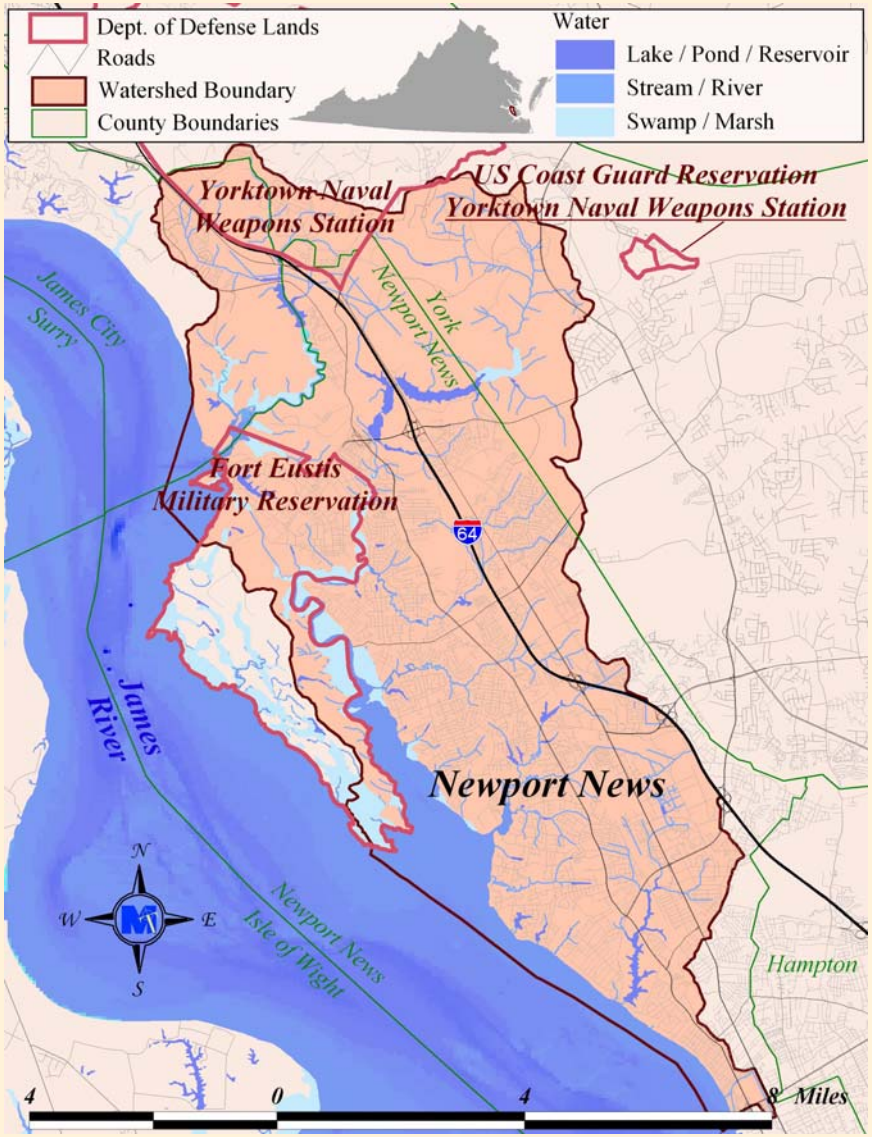
TMDL Development Steps

- Monitoring/Listing - Identify Water Quality Problem
  - Monitoring Ongoing
  - ✓ Listing Completed by DEQ and VDH
- Source Assessment – Locate Potential Sources of Pollutant in Watershed
  - → Estimates Presented here – Please validate
- Modeling – Examine the Movement of Pollutant from Land to Water and Direct Inputs to Water
- Allocation/TMDL – Use a Computer Model to Determine the Load Reductions Necessary to Achieve Water Quality Goals

Water Quality Standards = Goals

- **DEQ Primary Contact Recreational Use**
  - Enterococci Bacteria (for Estuarine)
    - Two standards
      - 35 cfu/100mL geometric mean
      - 104 cfu/100mL instantaneous sample
  - *E. coli* Bacteria (for Riverine)
    - Two standards
      - 126 cfu/100mL geometric mean
      - 235 cfu/100mL instantaneous sample
- **VDH Shellfish Harvesting Use**
  - Fecal Coliform
    - Two standards
      - 30-month 14 MPN geometric mean
      - 30-month 90th percentile 49 MPN

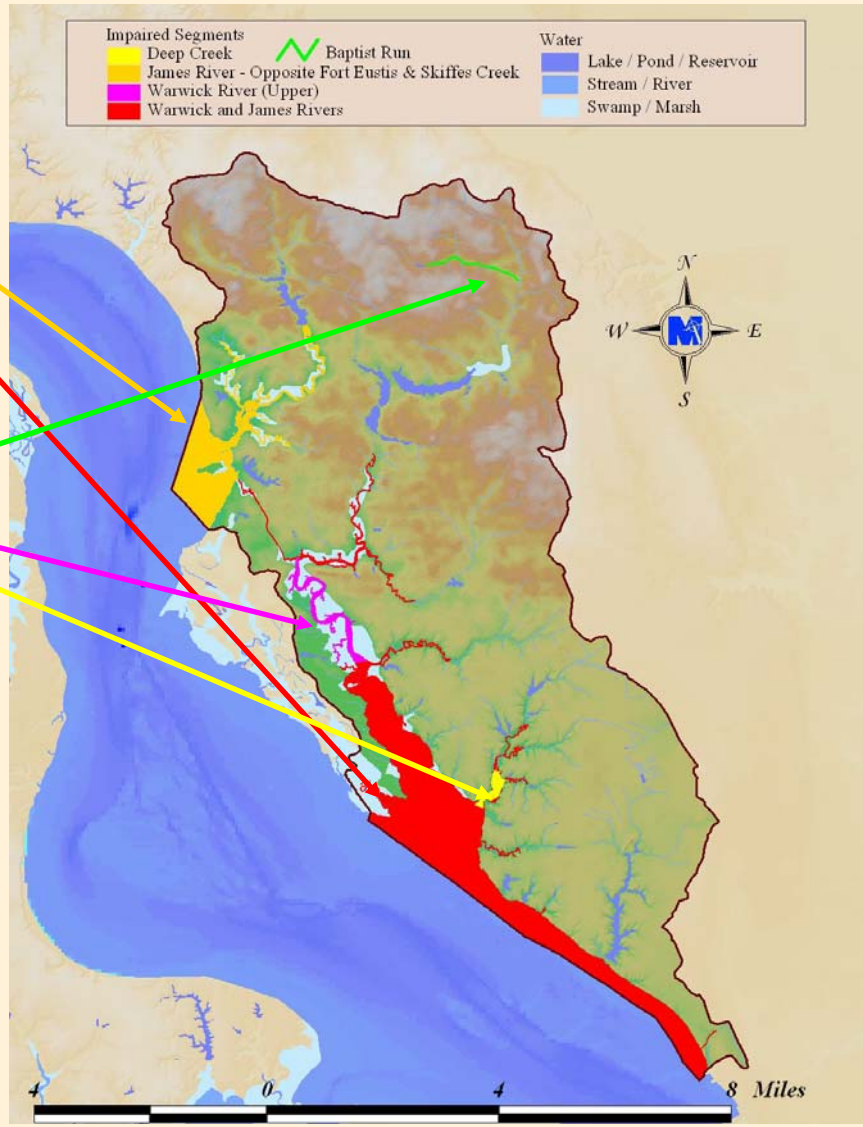
Where is the Watershed?



Where are the Impairments?

VDH – Shellfish Harvesting Use

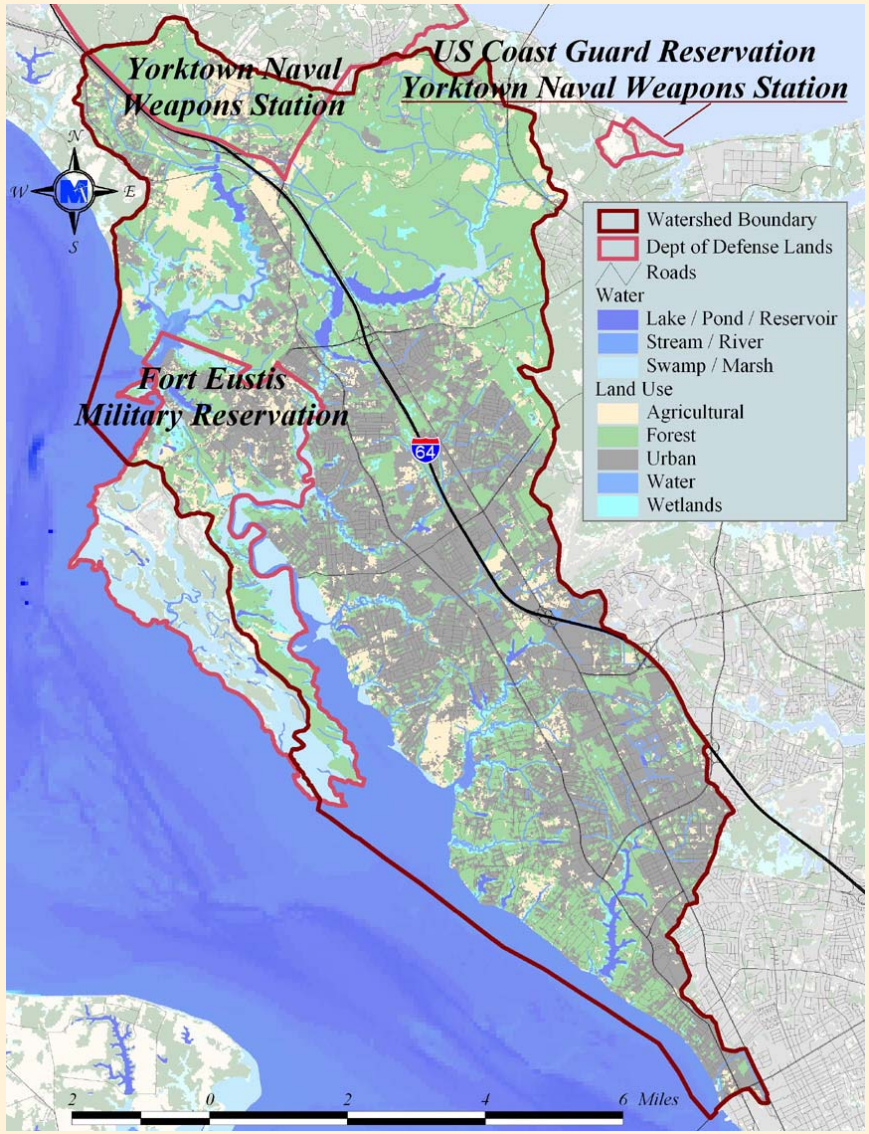
DEQ – Swimming Use



Where are the Impairments?

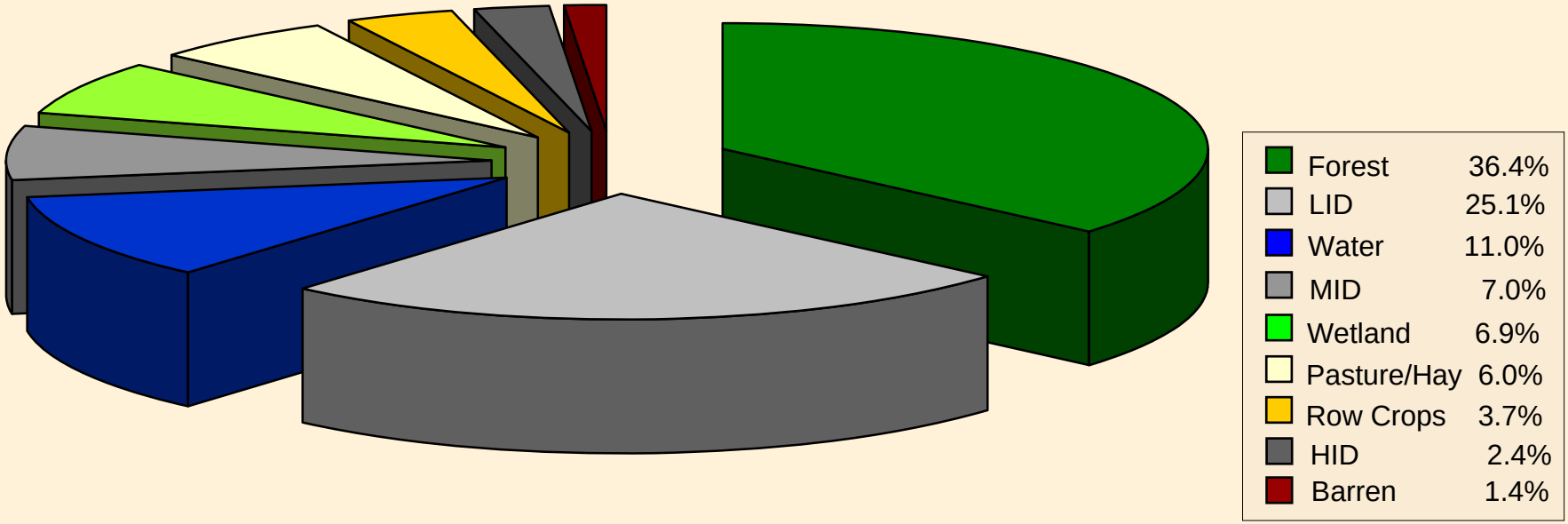
Impairment Name	Listed by	Reason Listed	Extent Description	Extent River Miles	Color in Figure
Baptist Run	DEQ	Excess fecal bacteria for swimming	Outflow of pond near Crawford Dr. to the confluence with Great Run and Beaverdam Creek	0.0 to 1.7	Green
Deep Creek	DEQ	Excess fecal bacteria for swimming	Warwick Yacht Club to the outlet of Deep Creek	0.76 to 0.0	Yellow
Warwick River (Upper)	DEQ	Excess fecal bacteria for swimming	End of tidal waters to the confluence with Lukas Creek	10.88 to 3.48	Magenta
James River – opposite Fort Eustis & Skiffes Creek	VDH	Excess fecal bacteria for harvesting shellfish	Condemnation Zone #059-023	4.08 to 0.0	Mustard
Warwick and James Rivers	VDH	Excess fecal bacteria for harvesting shellfish	Condemnation Zone #34	14.7 to 0.0	Red

Land Use

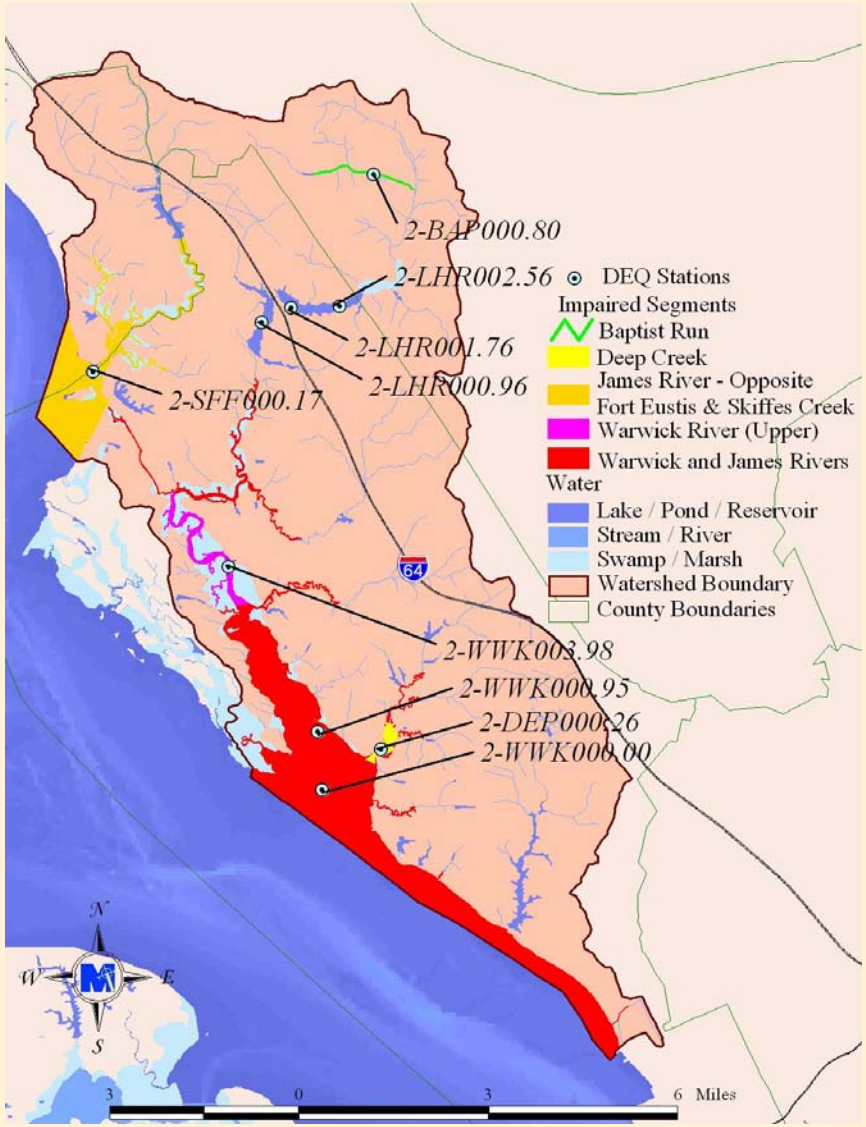

Yorktown Naval Weapons Station
US Coast Guard Reservation
Yorktown Naval Weapons Station
Fort Eustis Military Reservation
64
N
W
E
S
Watershed Boundary
Dept of Defense Lands
Roads
Water
Lake / Pond / Reservoir
Stream / River
Swamp / Marsh
Land Use
Agricultural
Forest
Urban
Water
Wetlands
2 0 2 4 6 Miles

Land Use Percentage

Total watershed area is about 48,400 acres



VADEQ Monitoring



VADEQ Fecal Coliform Data

January 1980 through November 2005

Stream	VADEQ Station	Count (#)	Minimum (cfu/100mL)	Maximum (cfu/100mL)	Mean (cfu/100mL)	Standard Deviation	# above 400 cfu/100mL	Violations[1] (%)
Deep Creek	2-DEP000.26	92	2	1,600	320	494	20	22
Skiffes Creek	2-SFF000.17	40	3	230	54	69	0	0
Warwick River	2-WWK000.00	44	2	100	22	33	0	0
Warwick River	2-WWK000.95	1	25	25	25	NA	0	0
Warwick River	2-WWK003.98	93	2	1,600	235	407	14	15
Baptist Run	2-BAP000.80	6	300	3,800	1,317	1,309	5	83
Lee Hall Reservoir	2-LHR000.96	7	25	100	36	28	0	0
Lee Hall Reservoir	2-LHR001.76	7	25	50	29	9	0	0
Lee Hall Reservoir	2-LHR002.56	10	25	3,400	390	1,059	1	10

[1]Violations are based on the current fecal coliform instantaneous standard (400 cfu/100mL)

VADEQ E. coli Data

July 2002 through March 2004

Stream	VADEQ Station	Count (#)	Minimum (cfu/100mL)	Maximum (cfu/100mL)	Mean (cfu/100mL)	Standard Deviation	# above 400 cfu/100mL	Violations[1] (%)
Deep Creek	2-DEP000.26	9	10	180	61	66	0	0
Warwick River	2-WWK000.95	1	10	10	10	NA	0	0
Warwick River	2-WWK003.98	9	10	120	37	37	0	0

[1] *Violations are based on the current E. coli instantaneous standard (235 cfu/100mL)*

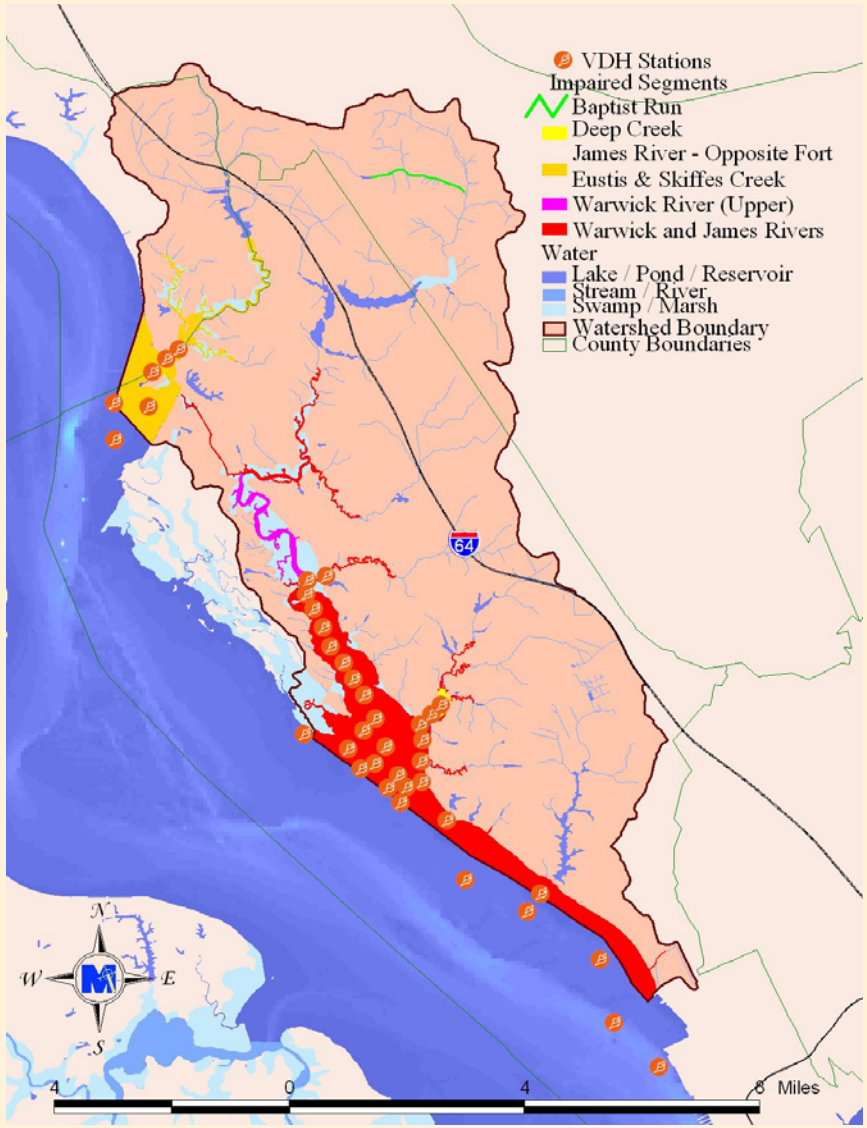
VADEQ *Enterococci* Data

March 2000 through December 2005

Stream	VADEQ Station	Count (#)	Minimum (cfu/100mL)	Maximum (cfu/100mL)	Mean (cfu/100mL)	Standard Deviation	# above 400 cfu/100mL	Violations[1] (%)
Warwick River	2-WWK003.98	22	10	1,000	114	231	4	18
Deep Creek	2-DEP000.26	22	10	420	84	108	4	18

[1] Violations are based on the current enterococci 90th percentile standard (104 MPN)

VDH Monitoring



VDH Fecal Coliform Data

Impairment	River	VDH Station	Count (#)	Mean (MPN)	Geomean[1] Violation (%)	90th Percentile[2] Violation (%)
Warwick and James Rivers	James River	57-E57	178	36.1	0	29
		58-A62	163	22.0	0	0
		58--A65	164	11.5	0	10
		58--B64	155	14.1	0	20
		58--B65	155	11.1	0	0
		58--C67	164	7.1	0	0
	Warwick River	58-1.5A	161	33.5	8	47
		58-10	164	44.2	45	78
		58-11	155	72.8	100	94
		58-12	155	84.1	100	100
		58-13	155	127.0	100	100
		58-13A	147	263.5	100	100
		58-1Z	163	11.9	0	0
		58-2A	160	49.4	30	52
		58-5	164	19.5	0	3
		58-6	164	23.4	0	8
		58-7	155	24.8	0	0
		58-8	164	41.8	17	25
		58-9	155	52.3	22	24
		58-JRSTP	164	27.7	15	24
	Warwick/ James conf.	58-0.5	164	14.6	0	0
		58-0.5Y	164	7.0	0	0
		58-0.5Z	155	12.2	0	0
		58-1A	153	27.9	20	36

[1]Violations are based on the current fecal coliform geometric mean standard (14 MPN)

[2]Violations are based on the current fecal coliform 90th percentile standard (49 MPN)

VDH Fecal Coliform Data (cont.)

Impairment	River	VDH Station	Count (#)	Mean (MPN)	Geomean[1] Violation (%)	90th Percentile[2] Violation (%)
James River – Opposite Fort Eustis | Skiffes Creek	James River	59--X79	69	32.33	0	0
	James River	59--X81	69	7.33	0	0
	James River	59--Z79	69	72.07	28	78
	Skiffes Creek	59--BB77	65	90.79	100	100
	Skiffes Creek/ James conf.	59--AA78	65	81.41	39	64
Warwick and James Rivers | Deep Creek	Deep Creek	58-3	164	122.82	78	99
	Deep Creek/ Warwick conf.	58-2.5	155	56.7	53	89
	Warwick River	58-4	194	187.04	100	100
None	James River	57-E61	182	8.09	0	0
	James River	57-F58	210	9.45	0	3
	James River	57-I54	182	18.19	0	1
	James River	57-M53	182	15.61	0	0
	James River	57-O50	182	10.73	0	0
	James River	58--E70	164	11.47	0	0
	James River	59--V81	210	11.66	0	0

[1]Violations are based on the current fecal coliform geometric mean standard (14 MPN)

[2]Violations are based on the current fecal coliform 90th percentile standard (49 MPN)

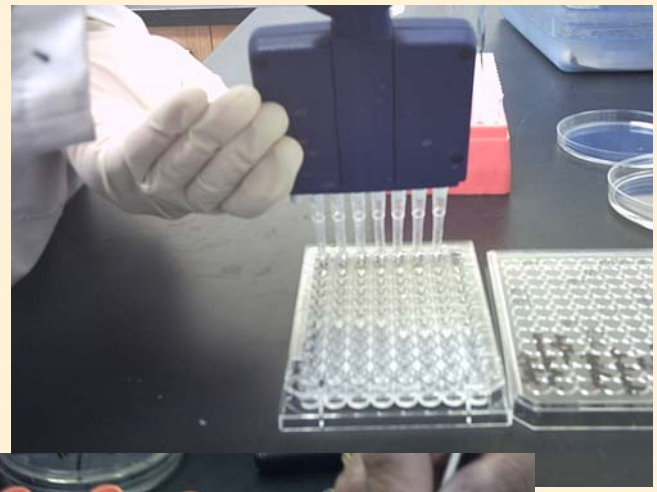
What are the Sources of Bacteria?

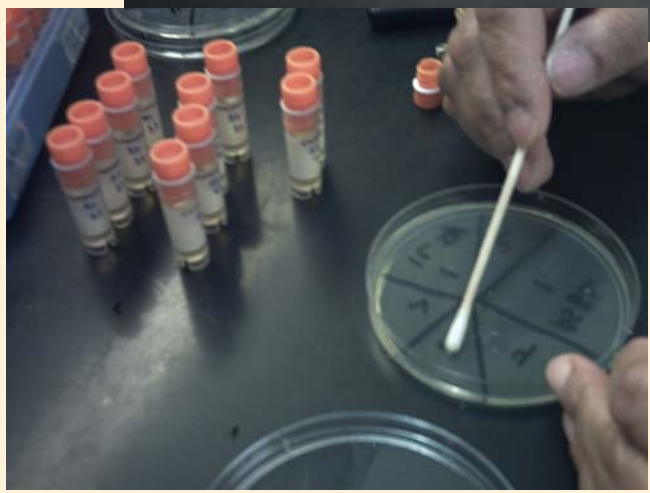
- Permitted discharges
  - Waste treatment facilities
- Human
  - Straight Pipes
  - Failing Septics
- Pets
- Livestock
- Wildlife

Bacterial Source Tracking (BST)

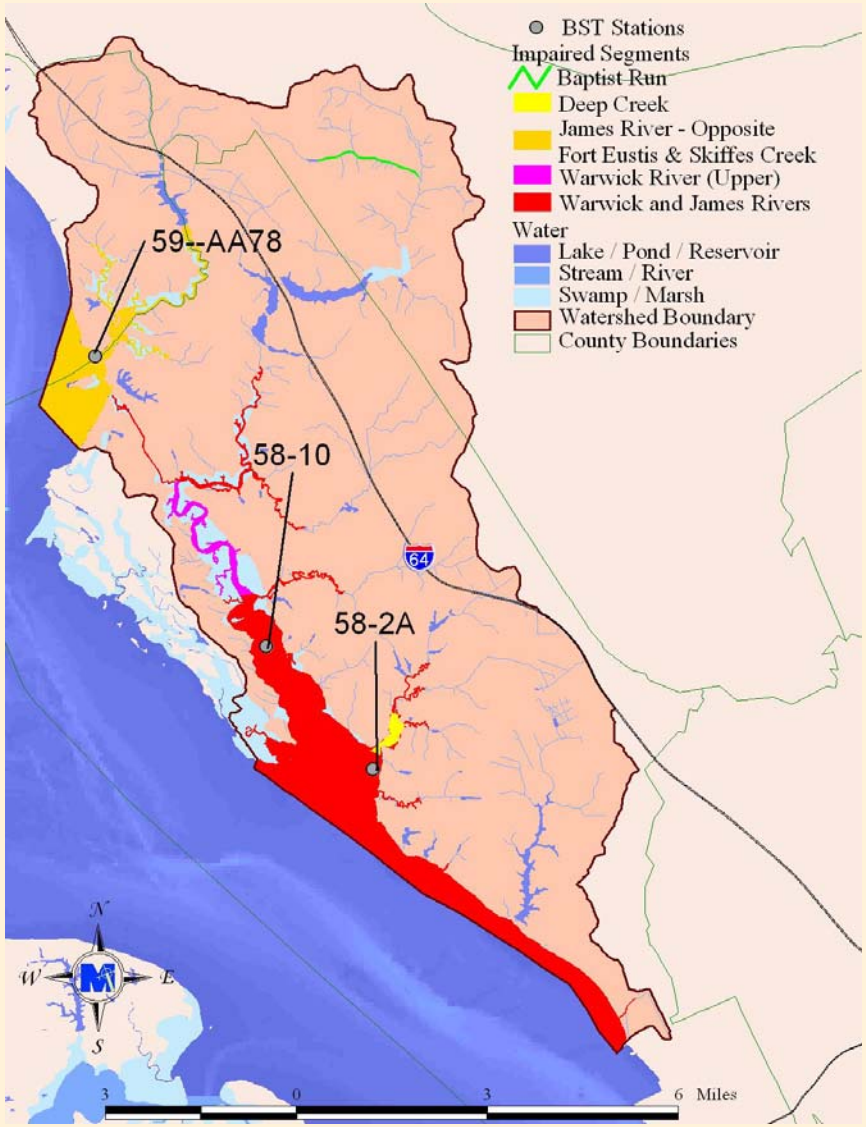
Independent Lab Test

- Determines bacteria source
  - Human
  - Pet
  - Livestock
  - Wildlife





BST Monitoring



BST Results:
What is the Predominant Source?

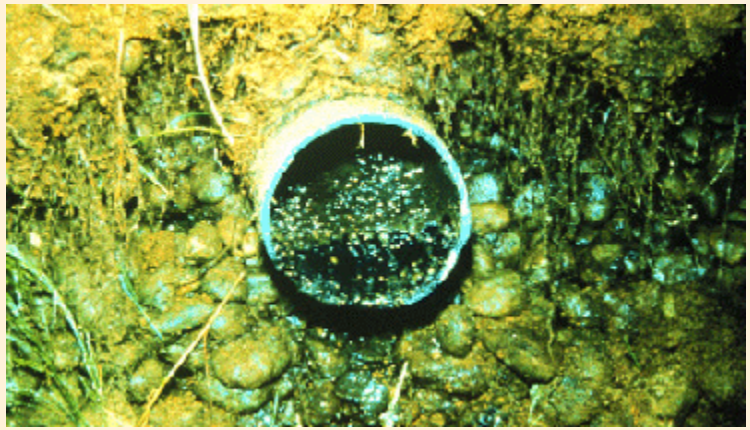
Impairment	Station ID	Weighted Averages:			
		Wildlife	Human	Livestock	Pet
Warwick River	58-10	18%	35%	23%	24%
Deep Creek	58-2A	19%	39%	14%	28%
Skiffes Creek	59-AA78	3%	21%	36%	40%

Human Sources

- U.S. Census
  - Population
  - Housing Units
  - On-site Sewage Treatment Systems
- Sanitary Sewer
  - Loading rates
    - Age, size, material of pipes
    - Overflows
  - Land-applied / direct deposition
    - Loading type
    - Proximity to stream

Human Sources

- Septic Systems
  - Failure to soil surface throughout year
  - Lateral movement continuously to stream
- Straight Pipes
  - Direct continuous input into stream
- Biosolids
  - None applied in this watershed



Human Population Estimates

Population	Housing Units				
	Number	With Sewer	With Septic	With Failing Septic	Other (Straight Pipe)
133,218	53,707	51,330	2,289	517	88

Pet Population Estimates

- Population/household based on literature values
- Translated to HU based on U.S. Census
- Land-applied

Dogs	Cats
28,679	32,117

Livestock Sources

- Population
  - Virginia Ag. Statistics
  - Consultation with Colonial SWCD
- Distribution of waste
  - Pastured
  - Confined and waste collected
  - Direct deposition to the stream
- Seasonal varying applications

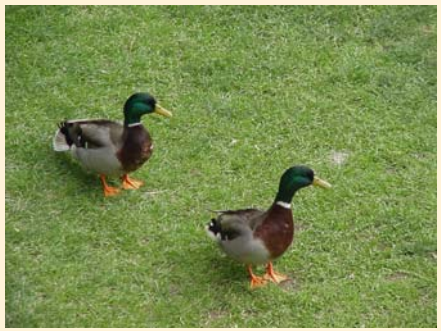
Livestock Population Estimates

Dairy Milkers	Dairy Calves	Dairy Dry	Beef	Beef Calves	Poultry	Swine	Horse	Sheep
6	2	2	17	2	0	0	49	2

Wildlife Population Estimates

- Population based on data provided by VDGIF biologists
- Distribution of waste based on habitat
  - Land-applied
  - Direct deposition to the stream
- Seasonal variations based on migration patterns and food sources

Beaver	Deer	Duck	Goose	Muskrat	Raccoon	Turkey
963	699	414	162	23,938	952	67



Warwick River Permitted Discharges

Permit No.	Name	Type	Receiving Stream	Currently FC in discharge	Design Flow (MGD)
VA0081272	HRSD- James River Sewage Treatment Plant	WWTF	Warwick River	YES	20.003
VAG113000 (H)/ VAG110039(A)	Ready Mix Concrete Company – Plant 47	Ready Mix	Unnamed Trib. to Skiffes Creek	NO	0.000001
VAG113036(H)/ VAG110113(A)/ VAG110150(A)	E.V. Williams Concrete Plant – Oyster Point	Ready Mix	Ditch to unnamed Trib. to Deep Creek	NO	0.0002
VAG113044(H)/ VAG110129(A)	TCS Materials – Newport News	Ready Mix	Unnamed Trib. to Jones Run	NO	0.0026
VAG110148(A)/ VAG113038(H)	Titan Virginia Ready Mix LLC – Skiffes Creek	Ready Mix	Skiffes Creek	NO	0.12
VAG523013 Permit expired 7/24/01	Menchville Marine Supply Corporation	Seafood	Deep Creek	NO	0.0025
VAG750039(A)/ VAG753029(H)	Newport News City Public Works Operation	Car Wash	MS4 to Sluice Mill Pond to Deep Creek	NO	0.005
VAG750051(A)/ VAG753000(H)	Enterprise Rent a Car	Car wash	Unnamed Trib. to Stoney Run	NO	0.00005
VAG830192 Terminated 9/28/04	Gasoline Station	Petroleum	Lake Maury	NO	0.0864
VAG830227(A)	Miller Mart #37	Petroleum	Stoney Run Creek	NO	0.015

Warwick River Permitted Discharges

How do we determine the TMDLs?

+

Watershed data

TMDL

E. coli (DEQ - Riverine) Total Maximum Daily Load

Impairment	WLA (cfu/year)	LA (cfu/year)	MOS	TMDL (cfu/year)
Baptist Run			*Implicit*	

Enterococci (DEQ - Estuarine) Total Maximum Daily Loads

Impairment	WLA (cfu/year)	LA (cfu/year)	MOS	TMDL (cfu/year)
Deep Creek			*Implicit*	
Warwick River (Upper)				

Fecal Coliform (VDH)
Total Maximum Daily Loads

Impairment	WLA (cfu/year)	LA (cfu/year)	MOS	TMDL (cfu/year)
James River - Opposite Fort Eustis and Skiffes Creek			*Implicit*	
Warwick and James Rivers *VA0081272*				

What bacteria reductions are recommended?

What's next?

- Final Public Meeting (TBD)
- 30-day Public Review
- Submit to EPA
- State Approval
- Implementation Plan Development
- Implementation

Warwick River TMDL Contacts

Megan Laird, Project Manager

3154 State Street

Blacksburg, VA 24060

(540) 961-7864 x407

mlaird@maptech-inc.com

Jennifer Howell, DEQ - Tidewater Regional Office

5636 Southern Blvd

Virginia Beach, VA 23462

(757) 518-2111

jshowell@deq.virginia.gov

Questions?

www2.ci.newport-news.va.us/newport-news/exit.asp?url=http://www.kwreservoir.com/